

[Reprinted from PSYCHE, Vol. XXXV, No. 2, (1928)]

# THE LARVA OF LEPTANILLA (HYM.: FORMICIDÆ)<sup>1</sup>

By GEORGE C. WHEELER,

University of North Dakota

## *Leptanilla revelierei sardoa* Emery

*Larva:* Body long, slender, subcylindrical, or thocephalic and straight except for the thorax which is slightly curved ventrally; with eleven distinct postcephalic segments. Diameter greatest at the sixth abdominal segment; decreasing slightly toward the posterior end which is rounded and terminates in a small hemispherical boss; and diminishing progressively to the anterior end, except for a slight constriction at the first abdominal segment. Relative diameters of the segments (beginning with the prothorax as the unit): 1.00-1.30-1.50-1.45-1.80-2.00-2.45-2.80-3.00-2.95-2.75. Relative lengths of segments: 1.0-1.9-3.4-3.1-3.6-4.0-5.3-4.0-3.7-3.3-7.7. (Fig. 1A)

Projecting downward and forward from the ventral side of the prothorax there is a curious structure suggestive of a plow-share. This is furnished with three hairs: a short, simple, slightly curved seta arising just back of the apex on the ventral side, and two longer pendulous hairs, which are curved at their distal ends and bifid at the tips, arising dorsolaterally just back of the middle of the structure. (Fig. 1B and E)

On either side of the fourth abdominal segment near the posterior border there is a bare circular area enclosed by a narrow heavily chitinized band, the whole structure (provisionally called "tympanum") being about 0.037 mm. in diameter. It is bordered by a fringe of stiff hairs, which are stouter and a trifle longer than those on the adjacent integument; there are also a few of these on the heavily chitinized band. Attached to the bare area near its posterior margin is an internal tube-like structure; this is twice bent and its diameter increases toward the inner end; its length is about 0.06 mm. (Fig. 1D)

<sup>1</sup>Contribution from the Zoological Laboratory of the College of Liberal Arts at Syracuse University.

Hairs of four types: (a) Minute, thin, somewhat flexuous hairs (length 0.01-0.03 mm.), which form a rather dense covering for the entire body, except the head, prothorax, "tympanum," and caudal boss; these are arranged in transverse rows encircling the body; they are spaced at distances roughly equal to their length, which is least at the anterior end and greatest at the posterior. (b) A few short, stout, rather stiff hairs, irregularly distributed and ranging in length from 0.02 mm. on the prothorax to 0.08 mm. on the last abdominal seg-

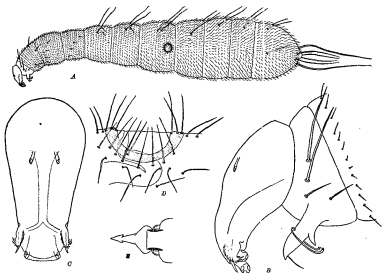


Fig. 1.—Larva of *Leptanilla rycklei sardos* Emery: A, in profile, X60; B, head and prothorax in profile, X410; C, cephalic aspect of head, X400; D, "tympanum," dorsal view, X580; E, cephalic aspect of plowshare-like organ on prothorax, X425.

ment. (c) Long hairs with rather flexuous tips arranged symmetrically in pairs on the dorsal surface, one pair each on the second to seventh (inclusive) abdominal segments; varying in length from 0.13 mm. to 0.16 mm.; four of the longest forming a ring around the base of the caudal boss. Just outside this ring there are attached (d) two extremely long (0.3 mm.) hairs; these six hairs converge apically and give the appearance of a caudal appendage.

Head (Fig. 1C) minute, naked, its outline pyriform when viewed from in front, twice as long as its greatest breadth (which is one-fourth of its length from the occipital border), narrowed at the base of the mouth-parts, with the occipital border broadly rounded. Antennal rudiments situated one-third of the length of the head from occipital border; long, narrow and apparently adnate to the head. Tentorium (?) conspicuous, in the form of a long, narrow, median bar, which is abruptly widened at the posterior end and furcate anteriorly, each division leading toward the base of a mandible.

Labrum semicircular, the margin finely undate, the basal angles produced outside the mandibles into stubby flaps which are toothed on their anterior and distal borders (Fig. 1B). Mandibles long, slender, slightly curved, acute, simple, feebly chitinated and directed downward and somewhat backwards along the sides of the labium. Maxillæ lobiform, each with three sensillæ. Labium narrowed at the base, broader at the distal border, which is smooth and slightly curved; with lobiform sense-organs at the anterior corners, each with three sensillæ; opening of sericteries not evident. Trophorhinium wanting.

This description is based on three larvæ, which have been cleared in potassium hydroxide (10%), stained with acid fuchsin, and mounted in balsam on slides. They are labeled "Sardegna: Golfo Aranci. I. 1909 A. Dodero."

I am indebted to Dr. Rafaelo Gestro of the Museo Civico di Storia Naturale of Genoa, thru the kindness of Dr. W. M. Wheeler, for this material.

The genus *Leptanilla* has always been more or less *incertæ sedis*. Emery, when he established it in 1870, placed it in the "Dorylidae" near *Typhlopone*. Mayr, however, in a letter to Emery (date not given—see Emery 1904) dissented, maintaining that it belonged with the Myrmicinae. Emery was evidently convinced, for in 1875 he removed it to the "Mirmicidei" in the neighborhood *Stenamma* and *Liomyrmex*. In 1877 he moved it to the vicinity of *Monomorium* and *Leptothorax* in the "Myrmicidei genuini" but marked it with a query to signify uncertain position. In 1881 Ern. André had it in the first tribe, "Myrmi-

cidæ veræ," of the "Myrmicidæ" but mentioned its affinities with the "Dorylides."

Forel in 1893 did not mention the genus but might have meant to include it in the subfamily Myrmicinae, when he said that the fourth tribe ("Myrmicii") included "les autres genres de la sous-famille des Myrmicinae." And later (1901) he excludes it from the Dorylinae when he says, "Done, je maintiens la sous-famille *Dorylinae* limitée aux genres *Dorylus*, *Aenictus*, *Eciton* et *Cheliomyrmex*." In von Dalla Torre's "Catalogus" (1893) it was still in the Myrmicinae but near *Trigonogaster* and *Pheidologeton*. In 1895 Emery was still of the opinion that it belonged in the subfamily "Myrmicini" in the second tribe ("Myrmicii") near *Huberia* and *Phacota*. But nine years later (1904), after describing the female of *L. revelierei* Emery, he returned it to its original subfamily (Dorylinae). In the following year, however, in Ashmead's skeleton it stood between "?*Liomyrmex*" and *Epipheidole* in the tribe Stenammini, subfamily "Myrmicinae," family "Myrmicidæ". In 1907 Santschi described males of three species, which he referred to the Genus *Leptanilla* and claimed that their doryline affinities justified Emery's original allocation of the genus. It should be noted, however, that males of *Leptanilla* have never been taken with females or workers; hence it is not certain that those described by Santschi belong to this genus. In the "Genera Insectorum" (1910) Emery established for the genus a separate tribe (Leptanillini) in the subfamily Dorylinae, where it seemed destined to abide in isolation; Wheeler (1910: "Tribe Leptanillii"), Forel (1917), and Forel (1921: tribe not given), and Wheeler (1922) have not disturbed it. But recently Wheeler (1923) has suggested that even further isolation may be necessary:

"Most myrmecologists recognize only five subfamilies of ants and regard the Cerapachyinae as belonging to the Ponerinae, the Pseudomyrminae to the Myrmicinae. It is probable, however, that future myrmecologists will increase the number of subfamilies. I believe that the tribe Leptanillini, which Emery includes among the Dorylinae, will have to be separated out as a distinct subfamily (Leptanillinae). Dr. George C. Wheeler

finds that the larva of *Leptanilla* is very aberrant, and the characters of the adult are either quite unlike those of other Dorylinæ or only superficially similar and due to convergence, or similarity of subterranean habits." (page 335)

The larva of *Leptanilla* does bear certain resemblances to the known doryline larvæ (*Dorylus*, *Aenictus*, *Eciton*, *Cheliomyrmex*): the long, slender, subcylindrical, orthocephalic, nearly straight body, narrowed progressively from behind forward; the small, feebly chitinated mandibles; the absence of a trophorhinium on the mouth-parts. On the other hand, it differs in the constriction at the first abdominal segment; the long hairs on the abdomen, especially the extremely long pair at the posterior end; the absence of hairs on the head; the shape of the head, which in the Dorylinæ is suborbicular. But these differences become trivial and insignificant beside the four which not only differentiate it from the Dorylinæ, but also from all other known formicid larvæ (130 genera). *Leptanilla* is unique in the (1) possession of the plowshare-like structure on the ventral side of the prothorax, (2) the "tympanum" on either side of the fourth abdominal segment and (3) the toothed flaps of the labrum and (4) in the position of the mandibles, which are directed downward and somewhat backward along the sides of the labium instead of lying across the front of the labium with their apices nearly touching or crossed.

These aberrant characters of the larva of *Leptanilla* support the contention of Dr. W. M. Wheeler (quoted above) that the tribe Leptanillini should be removed from the Dorylinæ and raised to the rank of a subfamily.

Concerning the functions of these peculiar structures nothing is known. The plowshare-like structure on the prothorax might be an exudatorium; the "tympanum" suggests an auditory organ. If the larvæ of this rare ant (or of any related species) are ever collected again, they should be kept alive in an artificial formicary and studied for the purpose of solving these problems. Also some specimens should be suitably killed and fixed for histological examination.

It is interesting in this connection to note that another

formicid subfamily has been based partly upon larval characters, namely, the *Pseudomyrminae* established by Emery in 1899. It is now known that the characters he used (hypocephaly and the presence of antennal rudiments) are not distinctive. Valid characters were found, however, by Wheeler and Bailey (1920) in their study of the larvæ of *Pseudomyrma*, *Tetraponera*, *Pachysima*, and *Vititicola*: the straight cylindrical body and the trophothylax. And Wheeler (1920, 1922, 1923) has since recognized the group as a distinct subfamily.

*Literature Cited.*

André, Ern.

1881-1882. Species des hyménoptères composant le groupe des formicides d'Europe, etc. Gray, pls. 1-25, 8 suppl.

Ashmead, W. H.

1905. A skeleton of a new arrangement of the families, subfamilies, tribes and genera of the ants, or the superfamily Formicoidea. *Canad. Ent.* 37: 381-384.

von Dalla Torre, K. W.

1893. *Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus*. Vol. VII: Formicidæ (Heterogyna). viii, 289, Leipzig.

Emery, C.

1870. Studi myrmecologici. *Boll. Soc. Ent. Ital.* 2: 9 p., 1 pl.

1875. Le formiche ipogee, con descrizione de specie nuove e poco note. *Ann. Mus. Civ. Genoa* 7: 465-474, 1 fig.

1877. Saggio di un ordinamento naturale dei myrmicidei e considerazioni sulla filogenesi delle formiche. *Boll. Soc. Ent. Ital.* 9: 1-17, 1 pl.

1895. Die Gattung *Dorylus* Fabr. und die systematische Eintheilung der Formiciden. *Zool. Jahrb. Abt. Syst.* 8: 685-778, 3 pl., 41 fig.

1899. Intorno alle larvæ di alcune formiche. *Mem. Accad. Sc. Bologna* (5), 8: 3-10, 2 pl.

1904. Le affinità del genere *Leptanilla* e i limiti delle *Dorylinae*. *Arch. Zool. Napoli* 2: 107-116, 9 fig.

1910. Family Formicidæ, Subfamily Dorylinæ in Wytsman's "Genera Insectorum." Fascicle 102, 34 p, 8 fig., 1 pl.
- Forel, A.
1893. Sur la classification de la famille des formicides, avec remarques synonymiques. Ann. Soc. Ent. Belg. 37: 161-167.
1901. A propos de la classification des formicides. Ann. Soc. Ent. Belgique. 45: 136-141.
1917. Cadre synoptique actuel de la faune universelle des fourmis. Bull. Soc. Vaud. Sc. Nat. 51: 229-253
1921. Le monde social des fourmis du globe. Vol. I. xiv, 192, 3 pl., 30 fig. Geneva, Librairie Kundig.
- Mayr, G.
1877. Ueber Dr. Emery's Gruppierung des Myrmiciden. Sitzb. Zool.-bot. Gesell. Wien 27: 23-26.
- Santschi, F.
1907. Fourmis de Tunisie capturées en 1906. Rev. Suisse Zool. 15, 2: 305-334.
- Wheeler, W. M.
1910. Ants: Their structure, development and behavior. xxv, 663, 286 fig. New York, Columbia University Press.
1920. The Subfamilies of Formicidæ, and other taxonomic notes. Psyche 27: 46-55, 3 fig.
1922. Ants of the American Museum Congo Expedition. A contribution to the myrmecology of Africa. Bull. Amer. Mus. Nat. Hist. 45: 1-1139, 103 fig., 47 maps, 45 pl.
1923. Social life among the insects. Being a series of lectures delivered at the Lowell Institute in Boston in March 1922. vii, 375, 116 fig. New York, Harcourt, Brace and Company, Inc.
- Wheeler W. M. and Bailey, I. W.
1920. The feeding habits of the Pseudomyrminæ and other ants. Trans. American Phil. Soc., Art. 4, 237-278, 6 fig., 5 pl.